



# Naval Air Systems Command Journey to System Software Process Improvement

Steve Underwood  
(760) 939-3197  
[underwoodsr@navair.navy.mil](mailto:underwoodsr@navair.navy.mil)

November 2001



# Outline

- Who we (NAVAIR) are
- Why Change / Improve
- Where we are headed
- How we're changing



# NAVAIR

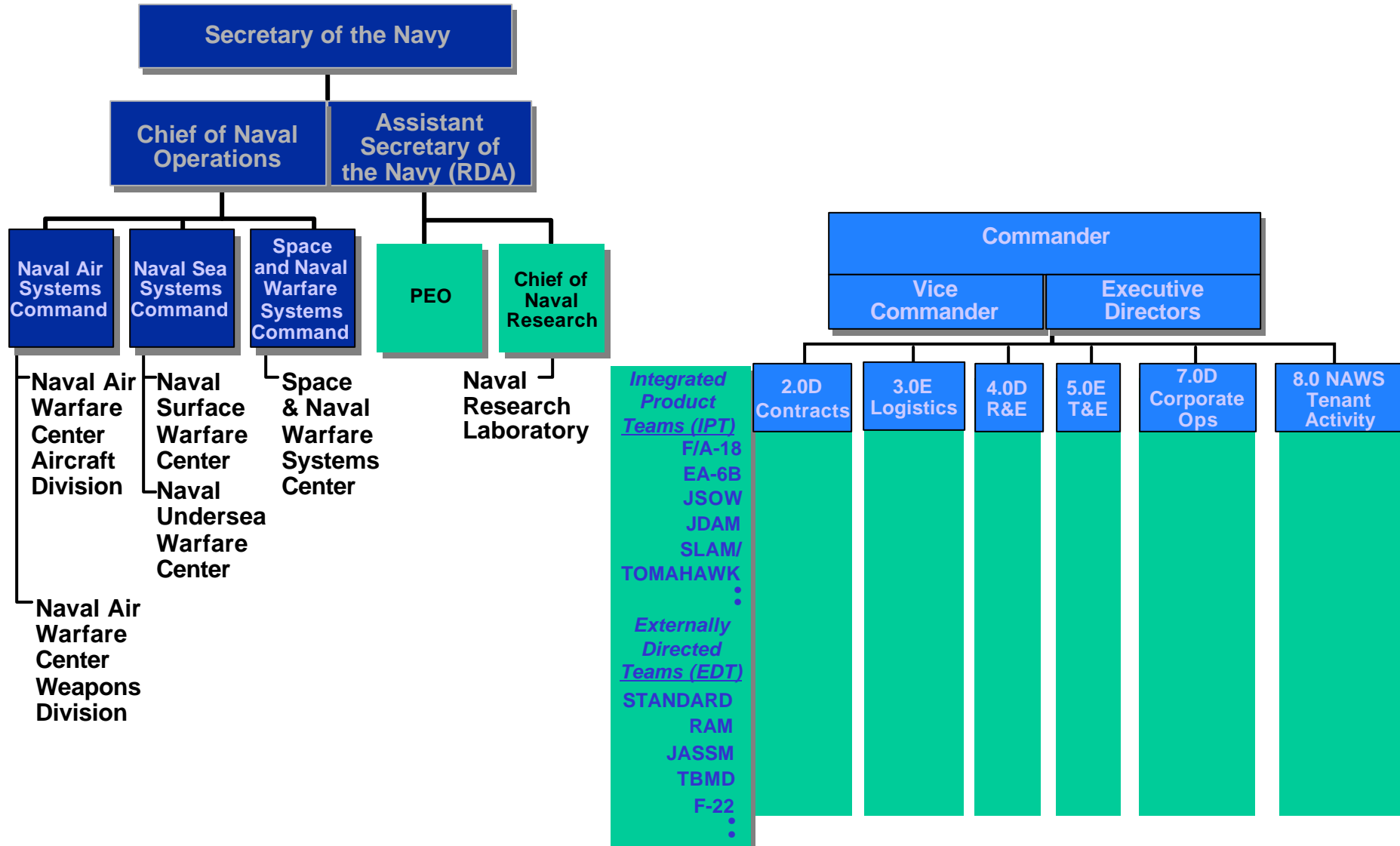
The Naval Aviation Systems Team, in partnership with industry, serves the nation and the Navy by developing, acquiring, and supporting naval aeronautical and related technology systems with which the operating forces, in support of the Unified Commanders and our allies, can train, fight, and win.

NAVAL AVIATION SYSTEMS



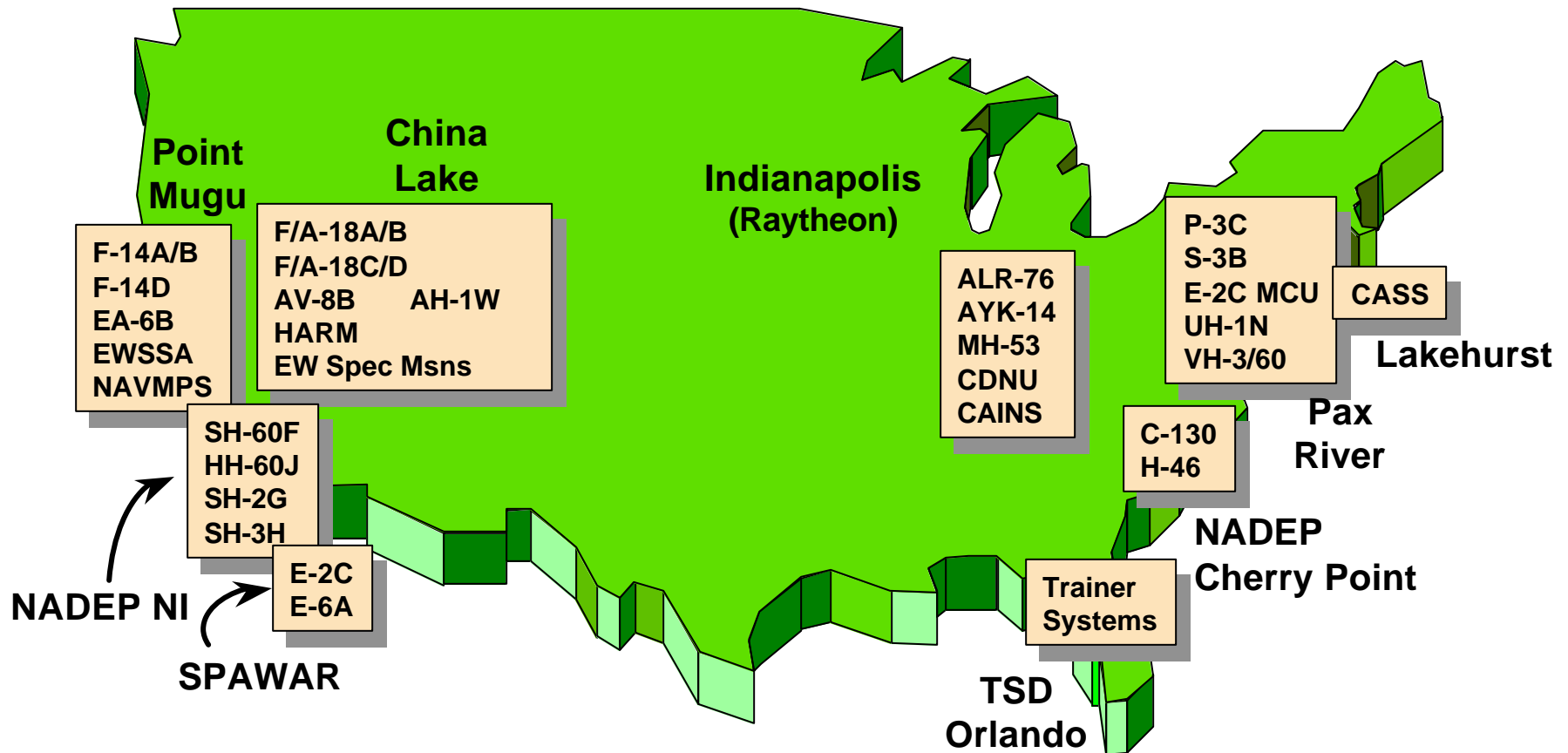


# An Integrated Organization





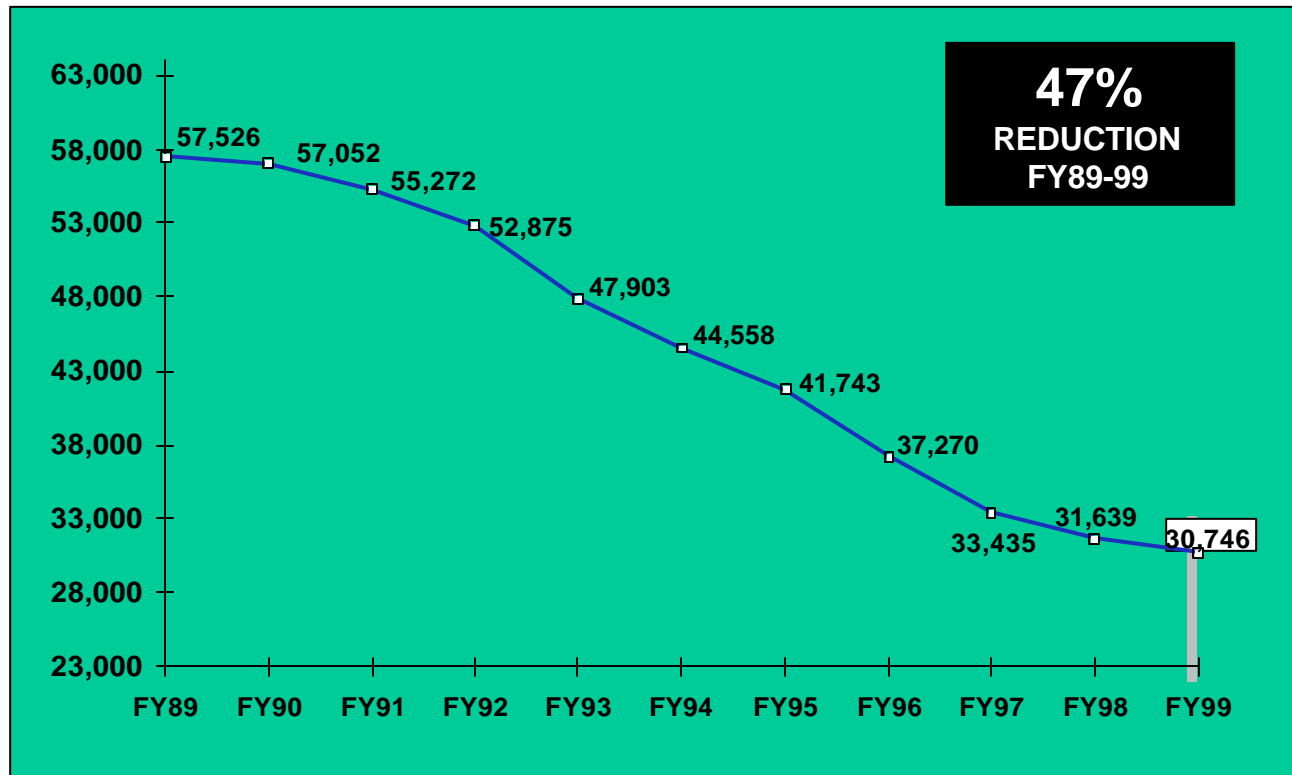
# Software Activity Locations



*Not all inclusive*



# NAVAL AVIATION SYSTEMS TEAM FY99 PEOPLE (MILITARY / CIVILIAN)



***We have downsized nearly 27,000 people***



# STRATEGIC GOALS

## WARFIGHTER

*IMPROVE WARFIGHTER  
SATISFACTION*

**“BETTER”**

## PEOPLE

*SHAPE AND TRAIN AN EFFICIENT AND  
EFFECTIVE WORKFORCE*

**“SMARTER”**

## TOTAL OWNERSHIP COST

*REDUCE THE TOTAL OWNERSHIP  
COST OF PRODUCTS AND SERVICES*

**“CHEAPER”**

## BUSINESS PROCESSES

*REDUCE CYCLE TIME FOR  
DELIVERING EQUIPMENT AND  
SERVICES*

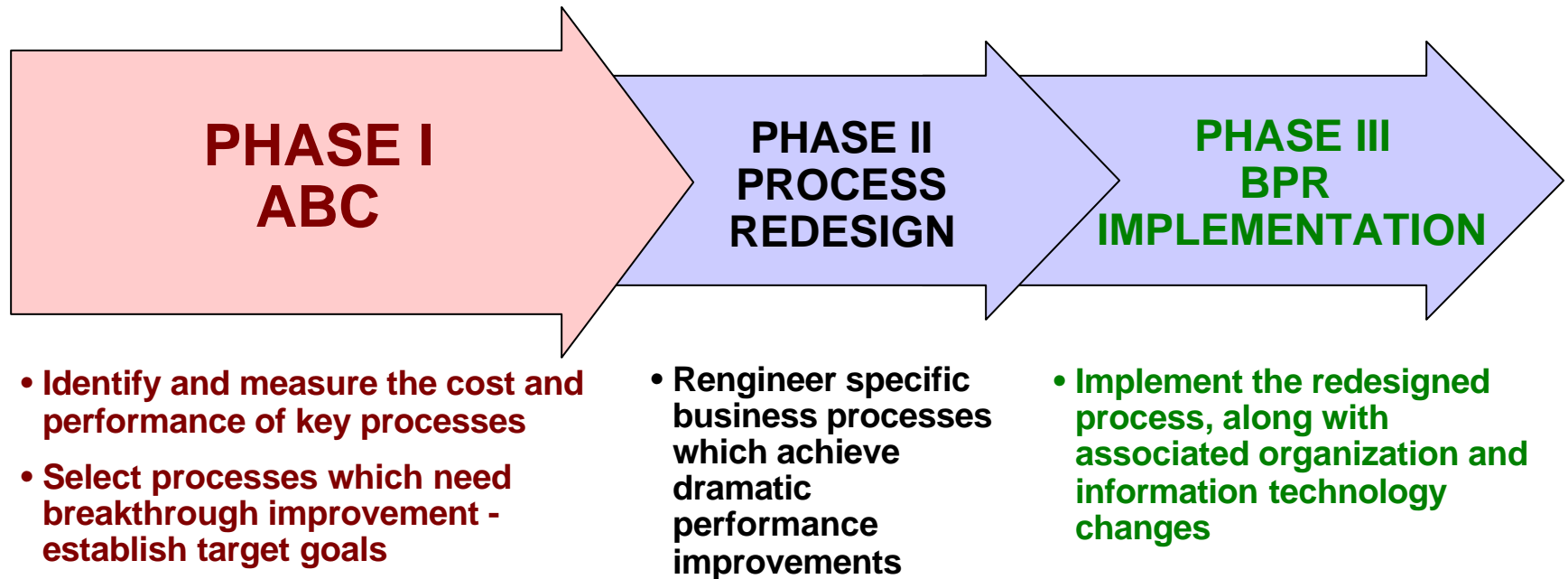
**“FASTER”**





# OVERALL APPROACH TO IMPROVE PROCESS PERFORMANCE

**A process reengineering implementation supported by comprehensive enterprise-wide cost and performance data**



***ABC PROVIDES AN INPUT TO SUPPORT  
FACT-BASED PROCESS REDESIGN / REENGINEERING***



# The Iceberg to Software Costs

**\$60M**  
**Captured by**  
**ABC study**

Software Coding  
Software Testing  
Software Development  
Software Design Engineering

**Industry  
Development**

**\$1 Billion**

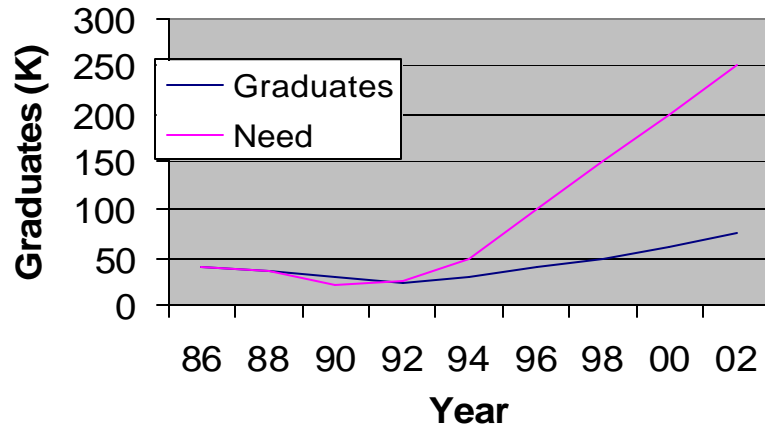
System Testing  
Range Support  
Data Collection  
Data Management  
System Engineering  
Direct Product M&S  
Tool Development and Use

**Not Included  
in ABC study**

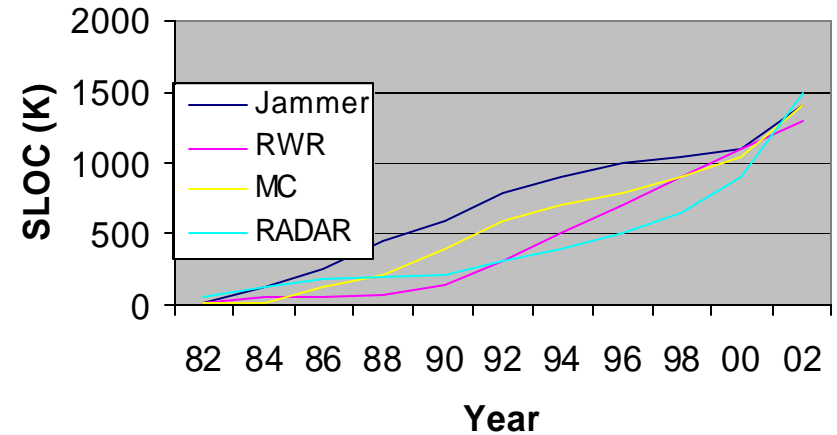


# Software Personnel Crisis

## Computer Science Graduates

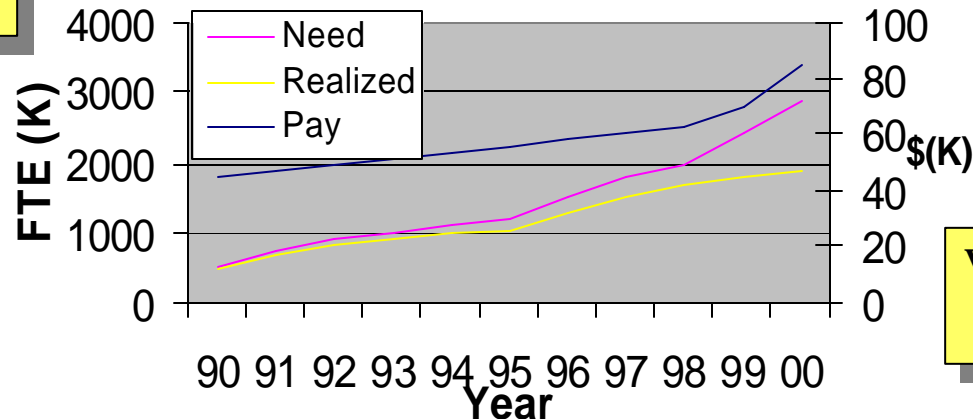


## SW Size



India is currently ramping up to produce 2M SW engineers by 2005 to fill our void

## Computer Scientists Shortfall vs Pay



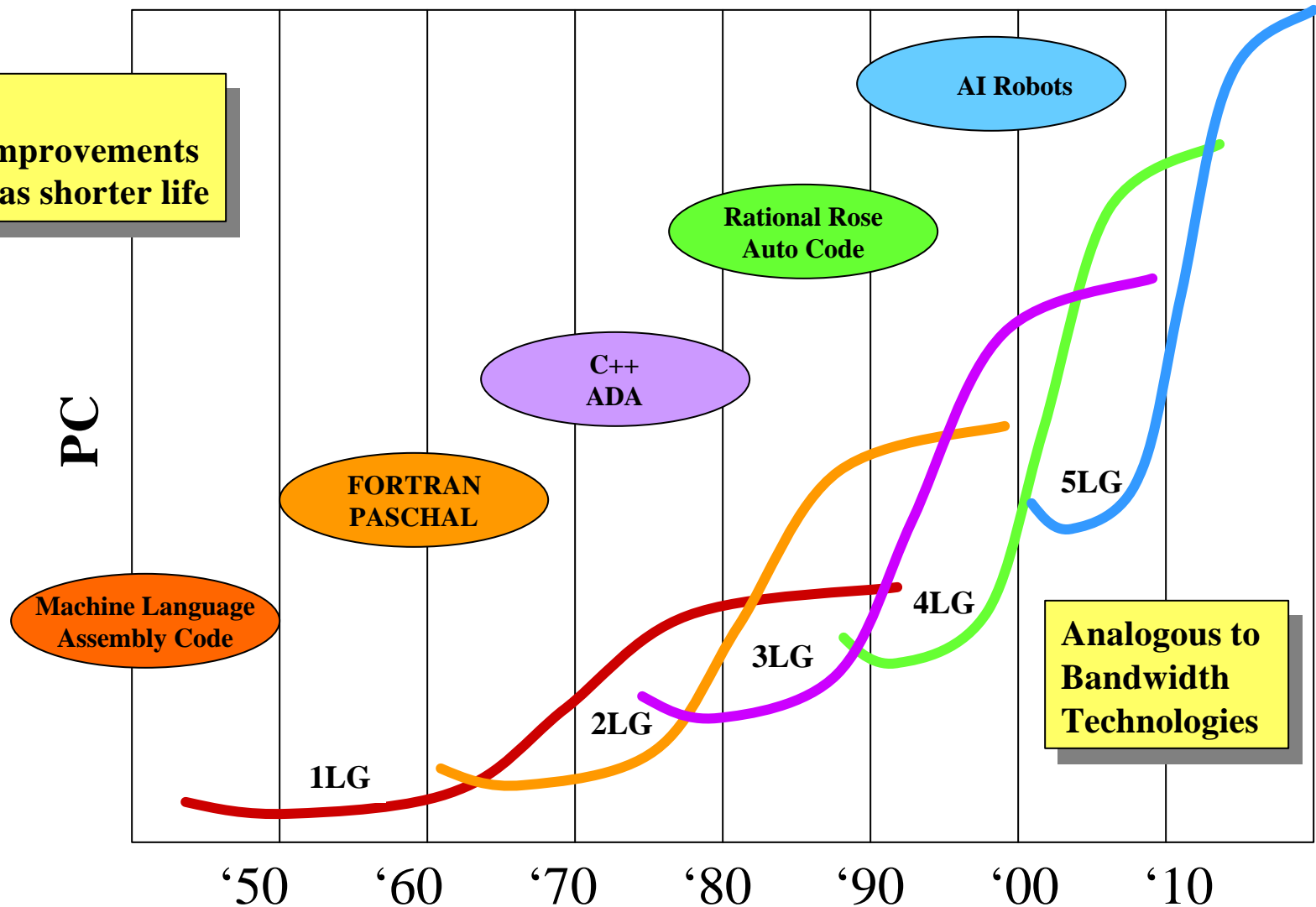
SW size doubles every 24 months

Various Sources  
US News and World Report  
IEEE

# Disruptive Technological Change for Language Generation

**Notes:**

- 1) PC Improvements
- 2) LG has shorter life





# Site Visit Best Practices

- Successful software development organizations utilize the Software Engineering Institute Capability Maturity Model (SEI -CMM).
  - \* **Process improvements defined by the SEI -CMM Levels (1 through 5) results in 30% productivity increase for each level improvement.**
  - \* **Test costs shift from 50% of the total costs to 30% by improving from a Level 3 to a Level 5 organization.**
  - \* **30% reduction in defects for each Level improvement.**
- **Successful software development organizations are motivated to improve by Senior Management commitment and vision.**
- Successful software development organizations have an initial investment and reinvestment up to 5% of their S/W product cost in improvement initiatives.
- **Successful software development organizations improve by utilizing corporate leadership teams (SEPG's, PAT's, and SEC's) to motivate and encourage the development of processes and procedures.**
- **Successful software development organizations are integrating Systems Engineering and Software Development Engineering processes together.**
- **In a partnering arrangement, organizations with similar maturity levels work better together.**

# Probability of Success



- (1) Capers Jones, Becoming Best In Class, Software Productivity Research, 1995 briefing
- (2) 1 Function Point = 50 SLOC ADA, 40 SLOC C++, 320 SLOC Assembly



# Software Vision

TEAM provides **integrated systems** that meet the customer requirements at the best value. We retain core software capabilities in a **government and industry mix**, which reacts effectively to a changing market. Our **highly skilled workforce** enjoys a disciplined, team-based work environment that provides challenging work and utilizes their knowledge to the maximum.

# Strategic Focus



## **Process Focus**

TEAM will reduce the cost of software acquisition, development and maintenance through the use of disciplined processes that are defined and implemented by both TEAM and contractor organizations.

## **Organization/Capabilities Focus**

TEAM will optimize and maintain the best skills mix within government and industry, develop and maintain the core system software expertise within TEAM, and eliminate redundancies among the various system software entities. The system software organization will be flexible and responsive to the fluctuating marketplace.

## **Workforce Focus**

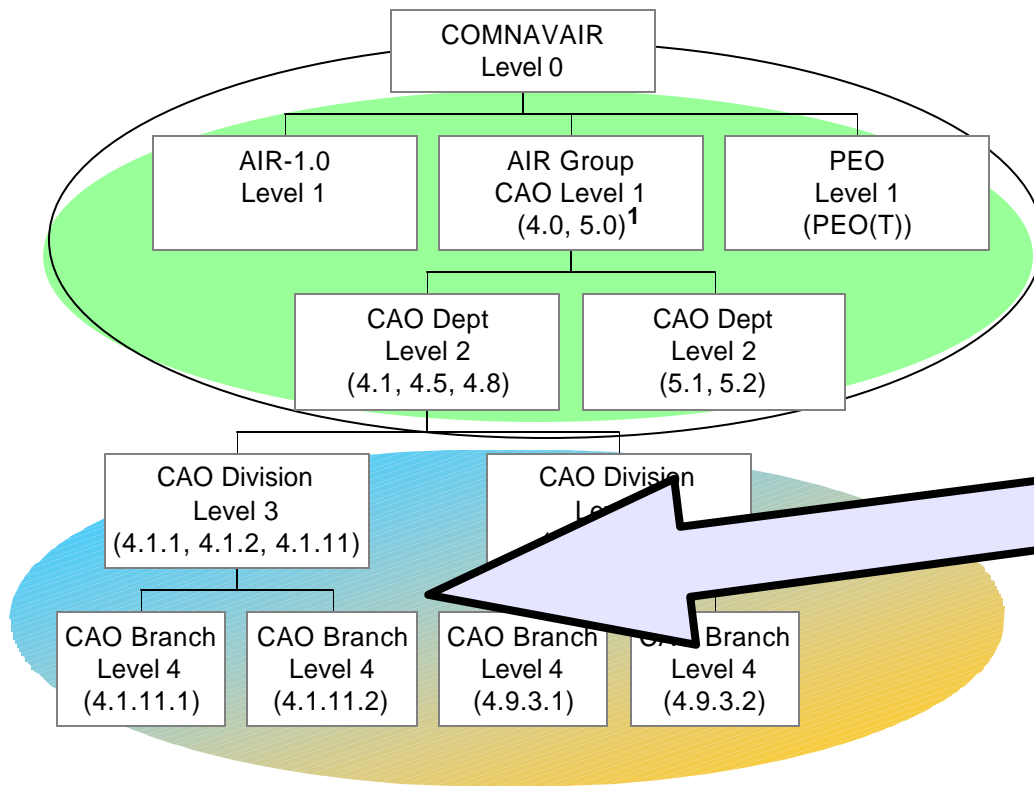
TEAM will develop a corporate culture characterized by excellent communications, knowledgeable leadership, and commitment to employee professional and personal growth. Empowered employees use policy, documented guidance, and defined TEAM processes supported by training, in the fulfillment of their job responsibilities. Our TEAM places value on, and works to maintain, work force continuity in core capabilities.





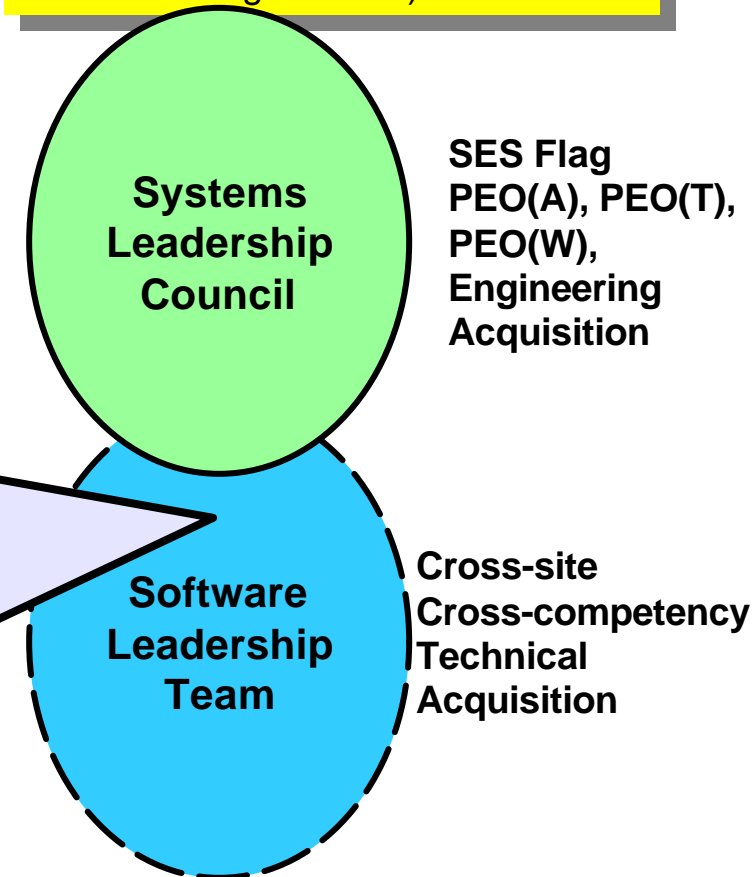
# NAVAIR Software Leadership

## Hierarchy (works gets done)



<sup>1</sup> AIR-codes used for example only

## Parallel Organization (strategic planning & TEAM initiatives gets done)





# SLT /SLC Focus

- Program Assist Teams
- NAVAIR Instructions
  - CMM Level III req'd in contracts (and in-house)
  - Process improvement req'd through all projects
    - CMMI
    - PSP/TSP
    - Continue CMM-SW
  - Independent Expert Program Reviews
- Core Skill Identification - Retention Strategy
- Establish NAVAIR Software Resource Center
  - Training      - Communication      -
- Identify working / partnering with Industry



# Strategic Shift CMM-SW to CMMI

- Initial Strategy and focus on in-house software development/ maintenance with CMM-SW
- Majority of TEAM software products are acquired as systems vice software only
  - Focus on effectiveness of software systems acquisition
  - Provide framework for systems engineering improvement
- We believe that CMMI is a good first step









# What NAVAIR Needs from CMMI

- Defense Systems Acquisition is our business
- We need to require from our acquirers the same discipline and repeatability that we now require from our software developers
- We need the processes, the framework, the training that addresses the need for acquisition program offices
- We believe that CMMI is a good first step towards those goals and we look forward to working with SEI and user groups



# PERFORMANCE IMPROVEMENT SCORECARD

## Example

SSA	Proj	Proj	Proj	Proj	Proj	Proj	Proj	Proj	Proj	Proj	Proj	Proj	Proj	Proj	Proj	Proj
SW-CMM																
PSP/TSP																
CMMI																
HPO																



# Summary

- NAVAIR is a large, diverse organization
  - Geographically dispersed
  - Diverse engineering applications
- Change throughout our organization will take time, patience, and commitment
- We have organized through our leadership teams that bridges the gaps to keep our “strategic” eye on the ball
  - From first line workers to executive and flag officers
  - From engineering specialists to program executives
- The Change required is cultural as well as engineering, discipline oriented

# Questions / Comments?

